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*The Mining Resources of France, 1841 to 1852.**By H. READER LACK, ESQ., *Statistical Department, Board of Trade.*

[Read before the Statistical Society, on Monday, the 21st of May, 1855.]

THE mining industry of France has made great progress of late years, and more especially during the period now under review; and there is every reason to believe that the results would have been still more favourable had not the mining interests received a severe check from the Revolution of 1848, from the effects of which they have not yet entirely recovered.

Although the production of the French mines is, at the present time, chiefly confined to coal and iron, the country is not wanting in metalliferous deposits, for, both under the dominion of the Romans, and still later of the feudal lords, mines of various kinds appear to have been worked on an extensive scale, and their abandonment in the year 1793 was mainly owing to the then unsettled state of the country.

The working of the coal mines in France to any great extent did not commence till after that date; and their production was comparatively trifling before the year 1800. Since the year 1832, however, great attention has been paid to mining operations, while a considerable increase in the production of *copper*, *silver*, and *lead*, in addition to that of *coal* and *iron*, has taken place since the year 1841.

France now produces coal and iron to a very considerable degree, and though not in sufficient quantities to supply the home demand, she ranks next to Great Britain as a coal-producing country, and occupies the first rank of the iron-making countries of continental Europe; the next in order being those of Russia, Sweden, Prussia, Belgium, and Austria. In the details of the statements which follow, the relative productions of the abovenamed countries, with reference to coal and iron, are given as far as obtainable from official documents.

It may be some guide towards forming a notion of the extent of the production of coal and iron in France, to know that that of *coal* is about *sixteen times*, and that of *iron four times*, less than the production of those minerals in Great Britain.

The consumption of *foreign coal* in France, which has largely increased since the year 1841, is nearly equal to that of the home production. The importation of iron is necessarily limited in consequence of the heavy duties imposed upon it; within the last three years, however, the import duties both on *coal* and *iron* have been greatly *reduced*, and it is to be hoped that those reductions will, by their beneficial results, go far to prove to the French government that protective duties are hindrances to national industry.

* This Paper is a continuation of one written by the late Mr. Porter, and published by the Statistical Society in 1844; the statements for the subsequent years have been taken from the official reports of the "Direction Générale des Mines," and from the Exhibition of 1851 Jury Reports.

Before proceeding to the detailed statements, it may be interesting to take a general survey of the *principal* mineral productions of France. The following comparative account will shew the increase in each description of metal since the year 1832.

Value of the Principal Mineral Productions of France in each of the Three Years 1832, 1841, and 1852.

Description.	1832.	1841.	1852.
	Francs.	Francs.	Francs.
Coal, Lignite and Anthracite	16,079,670	33,159,044	46,751,806
Iron and Steel (manufactured)	87,312,994	141,789,560	297,330,748
Silver and Lead	856,673	774,033	2,390,191
Copper.....	247,680	278,676	5,167,338
Total {	In Francs	104,497,017	176,001,313
	In £ sterling...	4,179,880	7,040,052
			14,065,603

It will be remarked, that in every instance there is a large increase in the productions of the year 1852, over those of the two former years, and that the total value of these productions in 1852 nearly doubled in amount those of the year 1841.

The detailed accounts of the mineral productions of France, are given under the three following heads of—1. *Coal Mines.* 2. *Iron Mines and Manufactures,* and 3. *Other descriptions of Metals.*

1. *Coal Mines.*

This branch of the French mining industry dates its commencement as far back as the early part of the 18th century, but it is only since the year 1800 that it has made rapid progress. The increase in the production of coal in France, of late years, will be seen from the accompanying table.

	Tons Produced.		Tons Produced.
1814.....	665,610	1841.....	3,410,210
1826.....	1,301,045	1847.....	5,061,183
1836.....	2,544,835	1852.....	4,816,355

It will be noticed that the production of the year 1836 was nearly double that of 1826, and that of 1847 nearly double that of 1836. The decrease in the year 1852, as compared with that of the year 1847, is attributed to the Revolution of 1848; and there is every reason to believe that, but for that cause, the production of the year 1852 would have more than doubled in amount the produce of the year 1841.

The great drawback to the extensive production of coal in France, arises from the difficulty of working the coal strata, which

are smaller, and lie deeper under the surface, than those in England and Belgium.

The area of the coal districts in Great Britain is estimated at about 4,250,000 acres; that of the French at 700,000 acres; and that of the Belgian at 450,000 acres. The production of the Belgian coal mines is about the same as that of the French mines, although the area of the mines is considerably less.

The production of coal in Russia is very trifling in amount, which naturally proves a great impediment to the use of machinery, as well as to various manufacturing processes in that country. The annual average production of coal in the Russian Empire is stated to have been, in 1853, only 50,794 tons, and the value of the coal imported 202,464*l.*, so that the manufacture of iron in Russia must have been chiefly carried on by means of charcoal.

The production of coal in Sweden, in 1848, was about 160,000 to 170,000 barrels of 4 bushels each, and the imports 718,025 barrels.

The amount of coal produced in Prussia, in the year 1849, was about 3,600,000 tons, and the imports 353,977 tons.

The total amount of coal produced in Austria, which is also an iron manufacturing country, in each of the years 1847 and 1848, was 842,398 and 885,555 tons, respectively. The importation of coal into the Austrian empire was, in 1847, 43,710 tons, and in 1848, 39,200 tons.

These statements have been introduced here to show the relative production of coal in the principal iron manufacturing countries of the continent.

It is almost needless to remark that the prosperity of the British iron manufactories is owing to the iron and coal being produced in the same localities, which necessarily tends to cheapen the cost of the manufactured article by a saving in the cost of the fuel,—an advantage hardly possessed by any other mining country in Europe.

To return to the *coal mines* of France, we find that the number of coal fields (*bassins carbonifères*) at work in the year 1841, was *sixty-two*, and a similar number also in the year 1852, although the mines at work had increased from 256 in the year 1841, to 286 in 1852.

The production of the sixty-two coal-fields in the year 1852 was :—

Coal, Lignite and Anthracite.	
Quintaux Métriques.	
Bassin de la Loire.....	16,311,300
„ de Valenciennes.....	10,728,500
„ d'Alais	3,851,600
„ de Creusot et Blanzv.....	4,057,300
„ d'Aubin	1,710,300
„ de Commentry	2,209,700
„ d'Epinac.....	1,043,700
„ du Maine	1,010,100
„ d'Aix	1,056,300
Les 53 autres bassins	7,060,459
<hr/>	
Total { Quintaux Métriques	49,039,259
{ Tons	4,816,355
{ Value in £ sterling	1,870,072

It appears from the above table that of the sixty-two coal-fields at work in 1852, only nine produced coal to any extent; while the production of the remaining fifty-three did not exceed, on an average, 133,216 *quintaux métriques* each, or 13,083 tons.

The number of coal *mines*, as stated above, increased from 256 in the year 1841 to 286 in 1852, and the *average production* of *each mine* also increased from 13,321 *tons* in 1841, to 16,840 tons in the year 1852. The average production of *each mine* in the year 1832, was only 9,863 *tons*.

The number of workmen employed in raising the various kinds of coal in France was 29,320 in the year 1841, and 35,381 in 1852. Of these numbers 22,595 were employed *in* the mines in the year 1841, and 27,001 in the year 1852, the remainder being engaged in various occupations on the surface. A later official return states that the coal industry of France, and the different works connected therewith, afford employment to about 60,000 persons. The average amount of coal raised, by each person employed, was 116 tons in the year 1841, and 136 tons in 1852, shewing an increase of 20 tons to each workman in 1852, as compared with the production of 1841. The *average production* of *each mine* also increased by 3,519 tons in 1852, as compared with 1841.

The English census of 1851 states that 219,015 persons were employed in the coal mines of Great Britain in that year, and assuming that the production of coal in Great Britain is eight times greater than that of France, the *average* production would be about 175 tons to each person employed, which would be 39 *tons per head* more than the average for France.

The machinery employed in the French coal mines (steam and horse taken together), amounted to 11,216 horses' power in the year 1847, and 12,880 in 1852. The average official value of the coal produced in France was 7*s.* 9½*d.* per ton. During the years 1848 and 1849, the price of coal advanced, but declined again in 1850 and 1851 and in the year 1852; it fell below that of the year 1847, the year preceding the Revolution.

The next consideration is that of the consumption and importation of coal.

In the year 1841, the amount of coal consumed in France was 4,980,000 tons, and in 1852, 7,816,403 tons, shewing an increase of 2,836,403 tons, consumed in the year 1852, over that of 1841. Of the 7,816,403 tons consumed in 1852, 3,033,888 tons were of *foreign* production, and 4,782,515 tons of French production. In the year 1847, the amount of foreign coal consumed in France was 2,501,901 tons, and of French coal 5,010,382 tons. It will be observed, therefore, that the use of foreign coal had *increased* by upwards of 21 per cent. since that year (1847), whilst that of French coal had decreased nearly 4½ per cent.

The total *importation* of coal into France in each of the years 1841 and 1852, was

Countries from whence Imported.	1841.	1852.
	Tons.	Tons.
Belgium	992,226	2,081,338
Great Britain	429,950	640,740
Rhenish Provinces	196,502	318,470
Other Countries	482	127
Total	1,619,160	3,040,675

The most striking feature in this table is the large increase in the imports from Belgium in the year 1852, as compared with those in the year 1841,—an increase of 109 per cent. The connection of many of the French towns by means of railroads, together with the lower rates of duty imposed on the importation of Belgian coal, have no doubt been amongst the causes of this large increase in the supply from that country. The imports of coal from Great Britain had also increased, during the same period, by 49 per cent., and those from the Rhenish provinces by 62 per cent. The supply from other countries, which is very inconsiderable, exhibits a falling off in 1852, as compared with 1841.

The duties on the importation of coal into France were reduced in November, 1853, to 6s. 9½*d.* per ton, in foreign vessels, when imported at ports between Dunkirk and Sables d'Olonne; and 5s. 6½*d.* per ton at all other ports; coke to pay one-half above these rates. The import of coal from the United Kingdom, in 1853, was 698,062 tons, or an increase of 57,322 tons over that in 1852.

The export of coal from France is small, amounting in the year 1852 to only 40,621 tons. These exports were chiefly to Algeria, Spain, and Switzerland.

The extraction of peat may be mentioned here, as being in some measure connected with this branch of mining industry. It affords employment to from 50,000 to 55,000 workmen, annually. The value of the peat produced in each of the years 1847 and 1852, was

	£
In 1847.....	205,315
„ 1852.....	173,330

2. *Iron Mines and Manufactures.*

Iron, Raw.

We have now to notice the production and manufacture of iron in France.

The total amount of iron ore raised in France, was 3,401,843 tons in 1847, and 2,043,479 tons in 1852. The following table shows the means which were employed for extracting those quantities in each year.

Years.	Number of Mines and Workings.	Workmen Employed.	Machinery.	Ore Raised.
			Horse Power.	Tons.
1847.....	1,081	15,669	62	3,401,843
1852.....	952	11,601	117	2,043,479

The departments producing the largest quantities of iron, during these years, were those of Haute-Marne, Haute-Saône, Cher, Moselle, and Nord; the total production of these five departments amounting to more than *one-half* the total quantity raised.

The next in order stand the departments of Ardennes, Meuse, Côte-d'Or, Pas-de-Calais, Nièvre, and Aveyron, whose produce, added to that of the five above mentioned, amounted to more than *three-fourths* of the total production. Forty-seven other departments produced iron in smaller quantities, and twenty-eight not at all. It is moreover stated in the Report that there is reason to believe that iron does not even exist within their limits.

With regard to the production of raw iron in those countries which have been selected for comparison with France, we find that the annual average amount of iron ore raised and smelted in *Sweden*, in each year from 1843 to 1847, was about 325,000 tons; and the annual average production of the *Prussian* iron mines, in each year from 1845 to 1849, was about 250,000 tons. The annual average produce of the *Belgian* iron mines, in each year from 1845 to 1849, was 468,000 tons. The average production of iron in Belgium, during the five years 1845 to 1849, more than doubled in amount the average production of the five preceding years. The production of the *Austrian* iron mines, in the year 1851, was 63,000 tons.

Manufacture of Iron.

The manufacture of iron, which is of long standing in France, is the most important branch of its metallurgical industry. The ores of this metal are found in large quantities in the central part of the kingdom; and the soil of this region, which is not very fertile, has for centuries been devoted to the growth of timber for the use of the foundries and smelting works. Of late years, however, *coal* has been employed in the manufacture of this article; and, by a judicious use, it has had the effect of lowering the price of the manufactured iron without deteriorating the quality. Coal is employed in the ultimate processes of the manufacture in the production of wrought iron from the pig. The introduction of *coal* does not appear to have diminished the use of charcoal, but on the contrary to have rather increased it, although not in so large proportion as that of coal.

The dearness of fuel is one of the greatest impediments to the cheap and extensive production of iron in France; but it appears from the proportion of the value of the fuel to that of the iron produced, that a great economy of fuel has been made for some years past. The total value of iron and steel manufactured in the various departments in France, in the year 1841, was 5,671,582*l.*, and in

the year 1852, notwithstanding the great check which the iron trade received in 1848, to 11,893,227*l.*, or more than double the value of 1841. The total value of iron and steel produced in France in the year 1832, was only 3,492,519*l.*; the increase in the year 1852, as compared with that year, is therefore more than 240 per cent.

It may be as well to introduce here a statement of the production of the other iron-making countries of the continent. It will be noticed that in each instance, the manufacture of iron is considerably less than that in France. As the chief object of this paper, however, is to illustrate the progress of French mining industry alone, it has been deemed sufficient to allude to the other countries in general terms.

Russia.—The total average production of *cast* and *wrought* iron in Russia, in each of the 6 years from 1838 to 1844, and from 1844 to 1850, was

	Annual Average.	
	1st Period.	2nd Period.
	Tons.	Tons.
Cast Iron.....	168,445	187,755
Wrought do.	111,311	123,911
Total	279,756	311,666

The production of cast and wrought iron in *France*, in the year 1852, was 1,134,542 tons; and assuming that the Russian production of these two sorts of iron had increased in the usual proportion to about 350,000 tons in 1852, we shall at once arrive at the relative production of these countries, bearing also in mind that the manufacture of iron forms the principal part of the mineral industry of Russia.

Sweden.—Sweden is allowed to rank next to Russia in the production of iron noted for its fine quality, and peculiar adaptation to the manufacture of steel. The most celebrated mines in Sweden are those of *Dannemora*, *Utö*, *Nova*, *Phillipstad*, and *Gellivara*. The average production of *cast* and *wrought* iron in that country, in each year from 1843 to 1847, was

	Tons.
Cast Iron.....	156,907
Wrought do. and Steel	96,731
Total.....	253,638

Prussia.—The production of *cast* and *wrought* iron in Prussia, in the year 1849, was

	Tons.
Cast Iron.....	137,685
Wrought do.	119,959
Total	257,644

In the province of *Silesia*, the manufacture of iron is carried on upon a large scale, in the English system, coal and iron being there found together in great abundance; but, although possessing the same advantages as England in this respect, the coal is less fitted for the manufacture of iron than that of Wales or Staffordshire, which renders the employment of charcoal necessary to a great extent; and it is stated that three-fifths of all the bar-iron is made in charcoal fires. The mining operations in *Silesia* have made great progress of late years.

Belgium.—The manufacture of *cast* and *wrought* iron in Belgium, in the year 1849, amounted to

	Tons.
Cast Iron.....	158,805
Wrought do.	65,827
Total.....	224,632

The total manufacture of iron in Belgium in the year 1849, was considerably less than that of the year 1847.

Austria.—Austria produced 22,431 tons of *cast* and 15,320 tons of *wrought iron*, in the year 1851, making a total of 37,751 tons.

The following table gives a comparative view of the production of these several countries. For Great Britain the *estimated* production is for the year 1851.

Countries.	Iron Produced.	
	Pig and Cast.	Wrought.
	Tons.	Tons.
Great Britain	2,400,000	No estimate
France	601,700	532,700
Russia	187,700	123,900
Sweden	156,900	96,700
Prussia.....	137,600	119,900
Belgium	158,805	65,827
Austria.....	22,400	15,300

Although these sums do not exhibit the production of each country in any *one* particular year, they still may be taken as showing a fair relative proportion of the average amount produced by them.

In pursuing our enquiry with regard to France, we find that the different kinds of iron manufactured in France, in the year 1852, were as follows:—

	Quantity.	Value.
	Tons.	£
Iron, Cast, viz.—		
Pig	429,677	2,278,951
Castings, 1st melting	83,633	720,156
„ 2nd „	88,479	1,146,452
Total of Cast Iron	601,789	4,145,559
Iron, Wrought, viz.—		
Large goods.....	296,369	3,650,378
Small „	177,002	2,805,702
Rails	59,382	656,059
Total of Wrought Iron..	532,753	7,112,139
Steel.....	17,774	635,529
Total of Cast and Wrought Iron and Steel	1,152,316	11,893,227

The quantity of pig iron made in the year 1841, was 377,142 tons, and of malleable iron 263,747 tons.

The value of the fuel used in the different processes of casting and manufacturing the iron and steel, in each of the years 1841 and 1852, was

	1841.	1852.
	£	£
Charcoal	1,706,712	1,214,636
Wood	41,027	12,948
Coke	177,237	415,746
Coal.....	254,387	446,935
Total	2,179,363	2,090,265

It will be observed that the cost of the fuel was $38\frac{1}{2}$ per cent. on the value of the metal, in the year 1841, and little more than $18\frac{1}{2}$ per cent. in the year 1852. How far this decrease may be attributed to the fall in the price of fuel in 1852, as compared with 1841, will be seen from the following table.

Average Price of each Kind of Fuel used in the Manufacture of Iron and Steel in France in each of the Years 1841 and 1852.

	1841.	1852.
	£ s. d.	£ s. d.
Wood Charcoal, per ton	2 17 5	2 10 $4\frac{1}{2}$
Wood	0 4 7	per ton 9 $2\frac{1}{2}$
Coke	1 0 2	0 19 0
Coal	0 14 7	0 10 $5\frac{1}{2}$

The production of pig iron with charcoal requires about 150 per cent. of that fuel in the various processes of the manufacture; and when with coke 170 per cent. of the fuel. The official value of the *pig iron* produced in the year 1841, was 6*l.* 11*s.* 1*d.* per ton, and that in the year 1852, 5*l.* 5*s.* 10½*d.* per ton; the values of the other kinds of iron have decreased in about the same ratio.

The recent reductions in the duties on the importation of iron into France, are of considerable importance to British and other foreign manufacturers of this metal. In the year 1841, the import duties on *pig iron* were 3*l.* 2*s.* 6*d.* per ton, on *plates and bars*, according to dimensions, from 8*l.* 7*s.* 4*d.* to 16*l.* 14*s.* 9*d.* per ton. These duties have been reduced to the following rates, which came into operation on the 1st of January of the present year (1855).

		£	s.	d.
Pig iron	per ton	1	15	4
Bars, according to dimensions	“ { From	4	8	0
	“ { To	6	3	4
Iron plates	“	8	16	0
Steel, in bars, cast or wrought	“	13	4	0

Iron rails pay the same rates as iron bars according to dimensions.

The *imports* of *iron* into France, as already mentioned, are much limited in consequence of these heavy duties. The total quantity of pig iron imported in the year 1841, was 26,452 tons, and in the year 1852, 40,279 tons. In the year 1853, in consequence of the reduction of the duties, which, however, were still higher than those above stated, the imports of pig iron increased to 72,358 tons.

At present, Belgium supplies France with the largest share of this article, although, at one time, she occupied only a secondary position to Great Britain. In the year 1841, Belgium supplied France with little more than half the quantity supplied by Great Britain; but, in 1852 and 1853, she changed her position, and now sends more than double the quantity Great Britain does, a phenomenon which is the more remarkable as France is one of the best customers to the iron manufacturers of this country.

We may in conclusion mention that the quantities of British *iron and steel* exported to France in each of the years 1841 and 1852, were

	Tons.	Value.
1841.....	19,099	£ 95,943
1852.....	22,325	80,839

3. *Other Metals,*

The production of other kinds of metals than those of iron and coal in France, is exceedingly limited in amount, as will be seen from the table below :—

	1841.	1852.
	£	£
Copper.....	11,147	206,693
Silver	18,340	54,160
Lead	12,559	41,446
Litharge	8,972
Gold.....	2,490
Antimony	6,198
Manganese	5,899

The results of the year 1852 tend to show that the general mining industry of the country is daily assuming a more active spirit, and that it will, no doubt, continue in its onward progress, if nothing happen to impede its course.

The declared value of the British metals and coal exported to France in each of the years 1841 and 1852, was

	1841.	1852.
	£	£
Iron and Steel.....	95,943	80,839
Hardware and Cutlery	67,779	95,492
Copper and Brass	573,632	435,956
Lead	47,080	39,382
Tin and Wares, and Plates	39,629	27,596
Coals, Cinders, &c.....	155,243	226,613

The importance of a relaxation in the French tariff, both to this country as well as to France herself, is too well understood to require any comment here, though it may be as well to observe that as things at present exist, the *British Coal* and *Iron* interests with regard to the foreign trade of France, have a skilful and enterprising rival in the coal and iron producers of Belgium, who now enjoy the largest share in the foreign supply both of coal and iron required by France.